The Current Status of Treatment Strategies for Cerebral Aneurysms in Nagoya University and Affiliated Hospitals Based on a Questionnaire Survey

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Summary

We investigated differences in the treatment strategies for ruptured aneurysms among 26 hospitals affiliated with Nagoya University and any changes in those strategies based on responses to a questionnaire. We also surveyed the data concerning patients with a ruptured aneurysm collected from our affiliated hospitals between 2001 and 2002. In half of the institutes, angiography is performed immediately after an urgent medical examination, there are only five hospitals (20%) which have a basic policy of terminating the angiography within three to six hours after onset. In half of the institutes, the timing of the treatment also depends on the location of the aneurysm. In particular, the treatment for vertebro-basilar aneurysms tends to be done the next day or later. Low-grade subarachnoid hemorrhage (SAH) patients with mild symptoms tended not to be given any sedative drugs (46%), while patients with SAH in some institutes were sedated without informed consent regardless of the severity. The main treatment method for most anterior circulation aneurysms was clipping. Concerning aneurysms located in the posterior circulation and the origin of the ophthalmic artery, clipping and coiling were equally selected. Almost all the hospitals (92%) responded that their treatment strategy had not changed even after the report of the International Subarachnoid Aneurysm Trial (ISAT). There is a great deal of difference in treatment strategies and indications among institutions. In particular, institutions without neuroendovascular interventionists (NETists) frequently persist in the conventional policy, making it urgently necessary to bring NETists up-to-date on the latest advance in endovascular treatment.

Introduction

The outcome of subarachnoid hemorrhage (SAH) patients has been improved due to the advances in surgical techniques and perioperative management. In addition, a revolutionary new treatment modality, coil embolization, has expanded the surgical options as well as enhancing the safety of intervention for high-risk patients. Particularly important are two international randomized control studies concerning about the cerebral aneurysms, International Subarachnoid Aneurysm Trial (ISAT) and the 2nd report of the International Study of Unruptured Intracranial Aneurysms (ISUIA), these studies showed embolization to be superior to clipping in its short-term outcome 1,2. Such surprising results might establish a preference for embolization as the first choice. The purpose of this study using questionnaires is to determine what changes in treatment strategy were influenced by these results, and to assess the differences in management among our major affiliated hospitals.

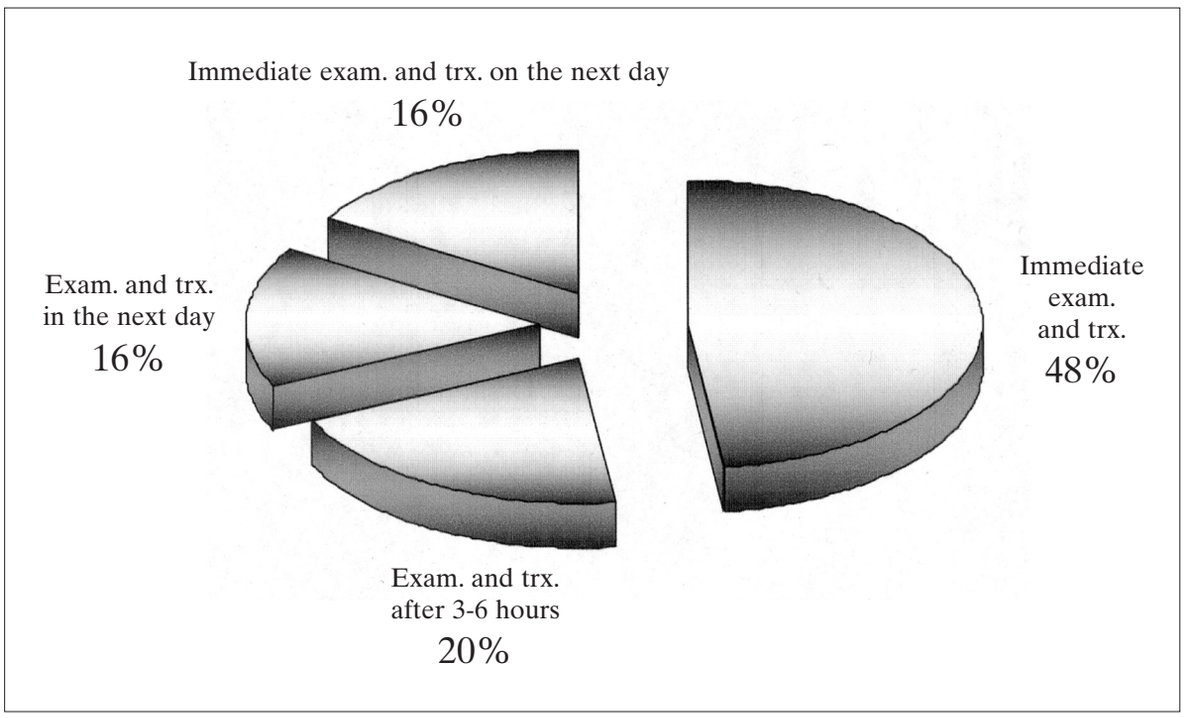

Figure 1 The timing of imaging examinations and treatment for aneurysms.

Methods

Our questionnaire on the treatment strategy for a ruptured aneurysm was sent to the 35 hospitals affiliated with Nagoya University, all of which were Japan Neurosurgical Society Grade A institutions. The questionnaires were designed to elicit responses on issues of treatment strategy, treatment timing, preoperative radiological examination, the method and timing of sedation, and the change, if any, between the treatment modalities before and after the ISAT study. We received responses from 26 institutions (74.3%).

In addition, we surveyed the data collected between 2001 and 2002 from Nagoya University and its affiliated hospitals where the number of patients with ruptured aneurysms was less than 30 per year. Finally, a total of 1336 patients with ruptured aneurysms were selected. Of those, we excluded 16 patients with an unidentified prognosis, 121 with unidentified treatment methods, 242 not treated at all and 37 given palliative treatment alone, leaving a total of 920 study subjects. Surgery was performed on 860 of them, while endovascular treatment to the remaining 60.

Results

The timing of imaging examinations and treatment for aneurysms

In half the institutes, an examination is performed immediately after an urgent medical evaluation (figure 1). Most hospitals (96%) used conventional angiography to evaluate the rupture site except for 1 hospital using 3D-CTA alone. As for the timing of the examination, in 5 hospitals cerebral angiography is not immediately performed. Five more (20%) had a basic policy of terminating the angiography within 3 to 6 hours after onset because of the high risk of intraprocedural rebleeding. The decision of an immediate interventional examination tends to depend on the time to of the patient's arrival at the hospital visit-to-the-hospital time. In 12 hospitals (46% table 1), if SAH patients except those who require the emergency treatment for conditions such as a massive hematoma arrive after 5 p.m., they are sedated and kept quietly overnight, and then examined and treated the next day. In half of the institutes, treatment timing also depends on the location of the aneurysms, vertebro-basilar aneurysms tends to be treated on the next day or later.

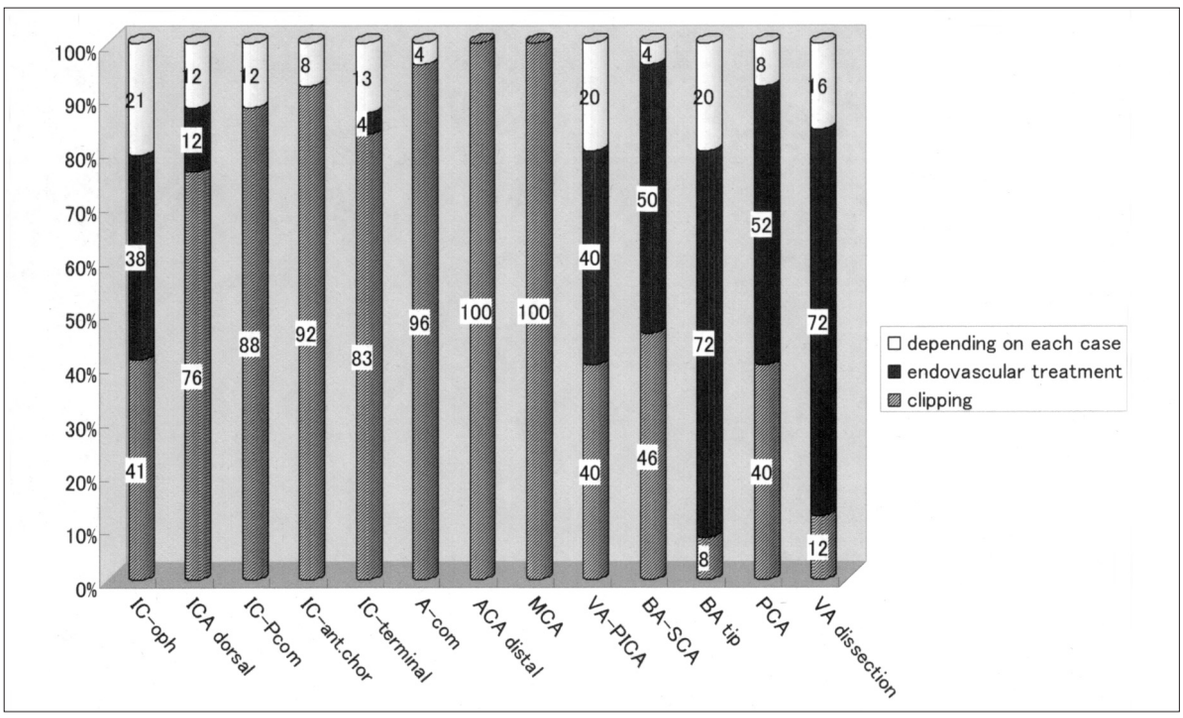

Figure 2 The first-choice treatment based on aneurysm location

The timing and agents of sedation

Pentazocine was the agent most frequently used in 15 hospitals (58%), followed by diazepam in 30% and midazolam in 27% (table 2). The low-grade SAH patients with mild symptoms were not administrated any sedative drugs in 12 hospitals (46%), whereas all SAH patients were sedated regardless of severity in 10 others (39%). In five hospitals (19%) sedation was begun as soon as the consent was elicited.

The first choice treatment based on aneurysm location

The main treatment method considered for each aneurysm location was shown in figure 2.

The first choice for anterior circulation aneurysms except for the ophthalmic segment was clipping. As for aneurysms at the origin of the ophthalmic artery, posterior inferior cerebellar artery (PICA), superior cerebellar artery (SCA), and the basilar bifurcation, either clipping or coiling were equally performed.

Table 1 **The timing of treatment using visit to the hospital time.**

Visit to the hospital time	Timing of treatment (%)
Anytime	On that day: 15%
Before 17 o'clock	On that day (otherwise next day): 12%
Before 20 o'clock	On that day (otherwise next day): 15%
Before 24 o'clock	On that day (otherwise next day): 19%
Anytime	On the next day: 39%

Table 2 **The timing and agents of sedation.**

Timing	as fast as possible	39%
	after taking the consert of the patient	19%
	no use for low grade SAH patient	46%
Agents	pentazocine	58%
	diazepan	30%
	midazolam	27%
	thiamylal	19%
	propofol	15%
	butorphanol	4%
	dorperidol	4%

Changes in treatment strategy after the ISAT study

Almost all the hospitals (92%) answered that their treatment strategy had not changed even after the report of the International Subarachnoid Aneurysm Trial (ISAT). The main reason for this persistent policy was attributed to the absence of endovascular interventionists in the institutes concerned. On the other hand, doctors in 6 hospitals (25%) pointed out that the result of ISAT was not acceptable given current Japanese level of surgical skill (table 3). There was no dispute between the two groups about the positive clinical outcomes (modified Rankin Scale 1 and 2) of both clipping (75%) and coiling (65%).

Discussion

The timing of angiography for patients with acute SAH varied among institutions, and seemed to depend upon the empirical policy established by the chief of surgery. Those who favored waiting based their decision on reports of the alarmingly high rerupture rate during angiography [3,4,5]. Our study showed that the majority of neurosurgeons gave priority to treating of ruptured aneurysms rather than incurring the risk of a fatal rerupture during the waiting hours.

The remaining problem of a lack of neurosurgical staff and anesthesiologists may considerably influence the tendency to avoid the nocturnal emergency operations.

We assume that the manner of the decision making and the selection of treatment modalities are strongly influenced by the staffs of each hospital. Those institutes without full-time neuroendovascular interventionists (NETists) were unlikely to opt for embolization. This result addressed the pressing issue of meeting the need for more trained NETists [6]. Another factors conspiring to put off early treatment is the dearth of anesthesiologists and assistants.

Table 3 **Changes in treatment strategy after the ISAT study.**

changed	8%
unchanged	92%
reason	
Absence of NETists	
Untrust of the ISAT study	
Confidence of the own clipping skill	
Conventionalism of the clip first polisy	
Existing positive introduction of embolization	

The location of the aneurysm influences the start of the treatment, e.g. the treatment of a posterior circulation aneurysm tends to be postponed, particularly in institutes with a "clip-first" policy, because ruptured vertebrobasilar aneurysms are very difficult to manage due to swelling of the brain in the acute stage. This concern may be alleviated with the introduction of endovascular treatments which can be performed independently of brain swelling. The surgical results for posterior circulation aneurysms were judged to be unfavorable in some previous reports [7-12], and suggested that the embolization should spread among more institutes as soon as possible.

There is also no consensus on the best sedation method for the acute SAH patients. Although sedation is clear useful in decreasing blood pressure in order to prevent a rerupture. It also makes it difficult to confirm changes in a patient's consciousness and to get the patient's consent to the treatments. Such a tendency favoring sedation seems to be based on the conventional faith that patients become anxious to hear the explanation of SAH and craniotomy resulting in the hypertension and rebleeding. Since we know empirically that patients in confused and irritable state run a high risk of rebleeding, the maximum effort to avoid a rerupture should be taken even if the patients consent had not explicitly been given to the treatment direction.

To achieve the appropriate sedation, observing the proper guidelines for the choice and dosage of sedative drugs is mandatory.

From our study various problems have been highlighted. The treatment method and management often seemed to be regulated based on the original manual in each institute which might be decided by the chief neurosurgeon. In particular vascular neurosurgeons confident in their own clipping skills or comfortable with the conventionalism of the "clip first" policy tended to distrust the results of ISAT, and hesitated to promote the introduction of embolization. Although there are many more controversial issues concerning the management of neurovascular diseases, we can not afford to ignore the recommendations based on evidence [7,13,14].

In the future, We must report high-quality studies based on the successful performance to spread emblization as useful technique

Conclusions

There are considerable differences in treatment strategies and indications among institutions. To meet the hard demands of medical economy and the rising expectations of society, the clinical ground on which we stand needs to be reconsidered.

Although reports providing high-grade evidence concerning endovascular treatment have appeared one after another, many institutions without NETists frequently persist in hewing to their conventional policy rather than meeting the urgent need to train more NETists and to promote the valuable advances in endovascular treatment.

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